I treats of the structure and properties of protoplasm, including its composition, its relation to external conditions, and its power of organism building. Division II deals with the physiological operations of plants. Here are included nutrition, growth, reproduction, irritability, locomotion, and protection. The last two are not treated, however, the statement being made that they are almost purely ecological in their nature.

The titles of the exercises throughout this entire part are put in the form of questions. The directions which follow are designed to aid the student in answering the question, but do not answer it for him. Just enough discussion is brought in with the laboratory directions to arouse the student's interest in the experiment in hand, and to make him appreciate what are its essential points. Ample references to the literature are constantly given, even to original articles; the author believes that direct contact with the sources of information is of great pedagogical value. Good half-tone reproductions of photographs show the student just how the more complicated forms of apparatus are to be set up. With their aid he should be able to bring his experiment to completion with a minimum amount of aid from the teacher.

Following this part are several pages of addenda in which are noted numerous improvements upon apparatus described in the body of the book.

The course as outlined by Professor Ganong will doubtless occupy more time than many can give to an elementary course in plant physiology. For such teachers the book will still be useful, since it is so well arranged that one can easily strike out a topic here and there without materially affecting the course as a whole. The style is clear, vivid, and scholarly throughout. We can think of no book yet published which might better "serve as a guide to the acquisition of a general physiological education."— BURTON EDWARD LIVINGSTON.

MINOR NOTICES.

THE *Transactions* of the American Microscopical Society **21**: 1900, contains 275 pages devoted largely to zoological papers and matters of general interest. The following are of special interest to botanists: C. A. KOFOID, *The plankton of Echo river, Mammoth cave;* HENRY B. WARD, *Comparative study of methods in plankton measurements;* GEORGE C. WHIPPLE, *Chlamydomonas and its effect on water supplies;* CHARLES E. BESSEY, *The modern conception of the structure and classification of diatoms*, with a division of the tribes and a rearrangement of the North American genera. Professor Bessey accepts Müller's view that the filamentous condition is the primitive one, and that diatoms should be regarded as typically filamentous rather than as unicellular forms. They should then be classed between the Peridiniales on the one hand, and the Desmidiaceae and Zygnemaceae on the other. The Zygnemaceae are regarded as the most primitive

of the Conjugatae, while the desmids and diatoms are believed to represent two similar and somewhat parallel genetic lines in which the filaments tend to break up rather early into independent cells. The larger part of the paper is occupied by a key to the tribes and genera of the American forms.— CHARLES J. CHAMBERLAIN.

NOTES FOR STUDENTS.

EXPERIMENTS by D. Neljubow[4] have shown that the peculiar horizontal nutation of stems of seedling peas (*Pisum sativum*) grown in darkness at high temperature is due to the presence of small amounts of illuminating gas in the air of the laboratory. It is especially the acetylene and ethylene components of illuminating gas which are active. SO_2, and vapors of CS_2, xylol, and benzol are very injurious. This peculiar reaction to gas seems to have been unknown before.— C. R. B.

A FEW interesting points regarding the behavior of apples in cold storage are brought out in a bulletin[5] by L. C. Corbett on this subject. With the exception of York Imperial, the apples of all varieties tested lost less in weight when stored in the light than when kept in darkness. The acid content of the apples was markedly decreased during storage, while the sugar content was decreased in some varieties and increased in others. No explanation for these differences of behavior is attempted.— ERNST A. BESSEY.

A NUMBER of experiments throwing light on the method of infection in pear blight are described in a bulletin[6] from the Delaware Experiment Station. The germs were introduced by means of needle punctures into terminal shoots, one year old wood, three year old wood, buds, leaves, and fruit. Leaves and young twigs were smeared with cultures of the germ and kept moist for a time. The latter, however did not cause the disease to develop, for it appeared only where the germs had actually been introduced into the tissue, as for example, where needle punctures had been made into the present year's terminal shoots, into buds, leaves, and into the fruit. The punctures into three-year old wood produced only small diseased areas. The author's conclusions are that pear blight is only communicated, as pointed out by Waite, by transference of the germs by honey-seeking insects from nectary to nectary, and into the fruits, young succulent shoots, and leaves by the introduction through bites and punctures of insects of germs clinging to their mouth parts. The same bulletin reports the occurrence in Delaware of pear canker, which seems to be caused by *Sphaeropsis malorum*.

[4] Beihefte z. Bot. Cent. **10**: 128–138. *figs. 2.* 1901.

[5] CORBETT, L. C.: Cold storage. Bull. West Virginia Agr. Expt. Sta. 74: 51–80. *figs. 1–3.* March 1901. Morgantown.

[6] CHESTER, F. D.: Pear blight and pear canker. Bull. Delaware Agr. Expt. Sta. 52: 1–8. *figs. 1–7.* April 1901. Newark.